



# Introduction to the Theory of the Early Universe: Cosmological Perturbations and Inflationary Theory

*Dmitry S Gorbunov, Valery A Rubakov*

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**Introduction to the Theory of the Early Universe: Cosmological Perturbations and Inflationary Theory**  
Dmitry S Gorbunov, Valery A Rubakov

This book accompanies another book by the same authors, *Introduction to the Theory of the Early Universe: Hot Big Bang Theory* and presents the theory of the evolution of density perturbations and relic gravity waves, theory of cosmological inflation and post-inflationary reheating. Written in a pedagogical style, the main chapters give a detailed account of the established theory, with derivation of formulas. Being self-contained, it is a useful textbook for advanced undergraduate students and graduate students. Essential materials from General Relativity, theory of Gaussian random fields and quantum field theory are collected in the appendices. The more advanced topics are approached similarly in a pedagogical way. These parts may serve as a detailed introduction to current research.

**Available as a set with *Introduction to the Theory of the Early Universe: Hot Big Bang Theory*.**

## Sample Chapter(s)

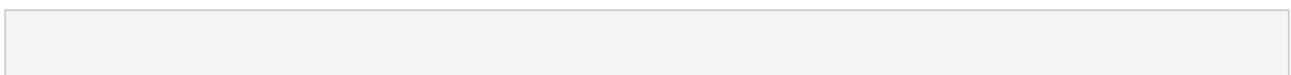
Chapter 5: Primordial Perturbations in Real Universe (272k)

Chapter 15: Preheating after Inflation (382k)

## Contents:

- Jeans Instability in Newtonian Gravity
- Cosmological Perturbations in General Relativity. Equations of Linearized Theory
- Evolution of Vector and Tensor Perturbations
- Scalar Perturbations: Single-Component Fluids
- Primordial Perturbations in Real Universe
- Scalar Perturbations Before Recombination
- Structure Formation
- Beyond Ideal Fluid Approximation
- Temperature of Cosmic Microwave Background
- CMB Polarization
- Drawbacks of the Hot Big Bang Theory. Inflation as Possible Way Out
- Inflation in Slow Roll Regime
- Generation of Cosmological Perturbations at Inflation
- Further Aspects of Inflationary Theory
- Preheating After Inflation
- Bouncing Universe
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**Readership:** Cosmologists, advanced undergraduate and graduate students.



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